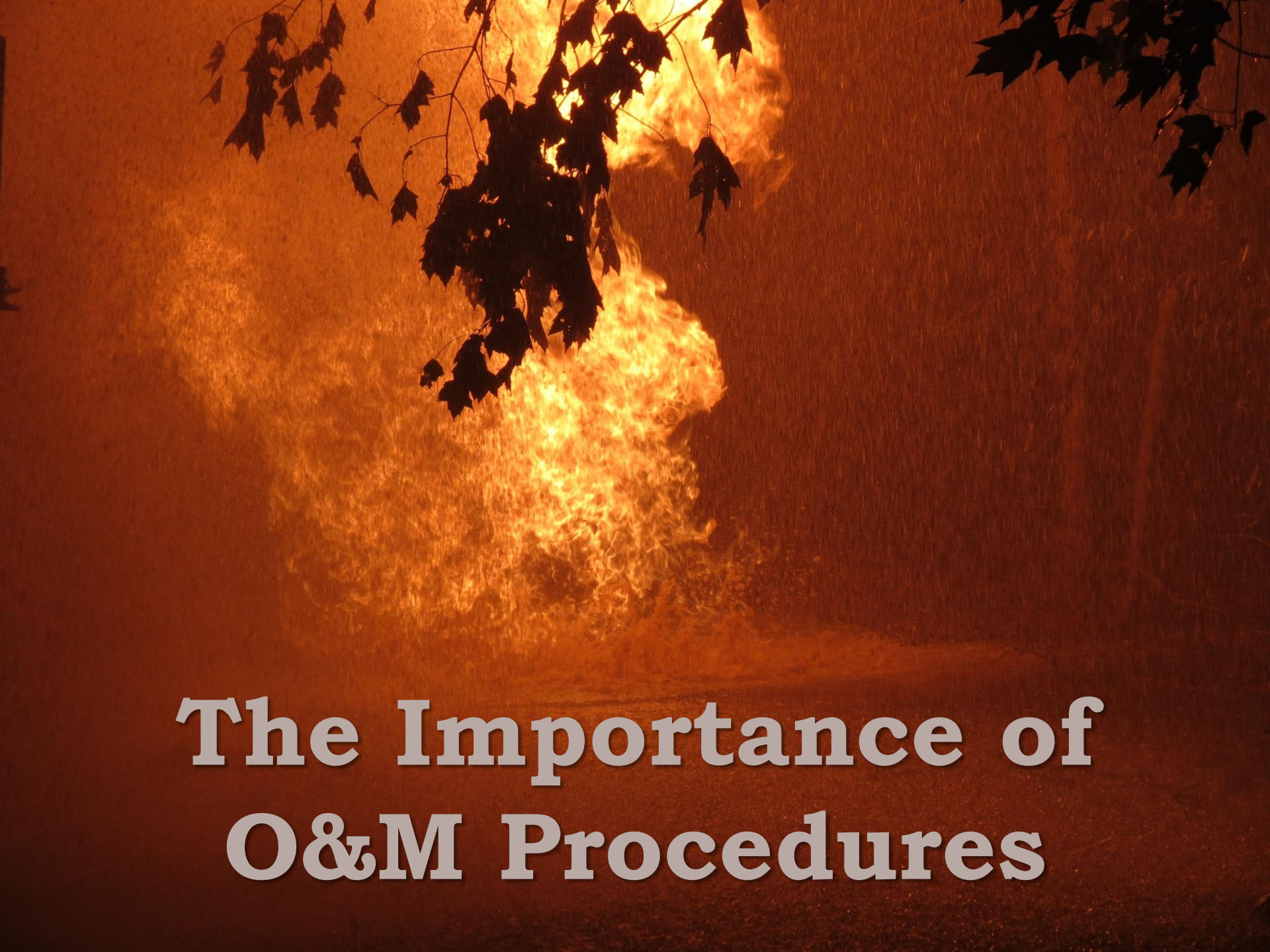


The Importance of O&M Procedures

Procedures without detail are not a way out of compliance.

They are an example of a Poor Safety Management System and Safety Culture.

§ 192.605 Violations

- Over the last 3 years we have noted 200 violations relative to 192.605
  - 152 Counts of Failure to follow written procedures
  - 48 Counts of failure to have adequate procedures

The Importance of Detailed Procedures

U.S. Department of Transportation, Pipeline and Hazardous Material Safety Administration's definition of a **procedure** is; **"A fixed, step-by-step sequence of activities or course of action (with definite start and end points) that must be followed in the same order to correctly perform a task."**

- §192.605 states "Each operator shall prepare and follow for each pipeline, a manual of written **procedures** for conducting operations and maintenance activities."
- Training does not negate the need for a complete and descriptive O&M Procedure.

Requirements of §192.605

- The manual must be reviewed and updated by the operator at intervals not exceeding 15 months, but at least one each calendar year.
- Each operator shall have a procedure for continuing surveillance of its facilities to determine and take appropriate action concerning changes in class location, failures, leakage history, corrosion, substantial changes in cathodic protection requirements, and other unusual operating and maintenance conditions.
- Appropriate parts of the manual must be kept at locations where operations and maintenance activities are conducted.
- The manual must include instructions enabling personnel who perform operation and maintenance activities to recognize conditions that potentially may be safety-related conditions subject to the reporting requirements of §191.23.

The consequences of not having good procedures

- Poor and inconsistent quality of task performed
- Added expense to the Company and rate payers by having to repeat tasks and make more frequent repairs
- Possible decrease in the life of the pipeline
- Penalties
- Increased safety risk to the public and Company personnel

Types of O&M Manuals

Purchased Manual

Advantages:

- Can be adopted quickly.
- May be more cost effective.
- Most of the major development work has already been done.

Disadvantages:

- Most likely will require modification to fit your system.
- Additional time and costs may be involved before implementation.
- May not be detailed enough for larger or more complex systems.

REMEMBER THE OPERATOR IS RESPONSIBLE FOR IT'S CONTENT

What to look for in an O&M Procedure.

- Procedures included for all O&M tasks.
- Procedures are understandable and could be followed by someone without extensive system knowledge (New Qualified Employee).
- Any standards or supplemental procedures referenced by the O&M are located with it.
- Operator staff are fully trained and familiar with O&M procedures, and know where they are located.

EXAMPLES OF INADIQUATE PROCEDURES

§192.739(a)

- (a) Each pressure limiting station, relief device (except rupture discs), and pressure regulating station and its equipment must be subjected at intervals not exceeding 15 months, but at least once each calendar year, to inspections and tests to determine that it is-

- (1) In good mechanical condition;
- (2) Adequate from the standpoint of capacity and reliability of operation for the service in which it is employed;
- (3) Except as provided in paragraph (b) of this section, set to control or relieve at the correct pressure consistent with the pressure limits of §192.201(a); and
- (4) Properly installed and protected from dirt, liquids, or other conditions that might prevent proper operation.

The Company's O&M states:

"These procedures apply to pressure reducing installations where over-pressure protection is provided by an additional device that is NOT an integral part of the primary pressure regulator; i.e. internal relief. (See 192.743):

a) Inspect the equipment of each pressure reducing station at intervals not exceeding 15 months but at least once each calendar year to determine if its in good mechanical condition. Record the inspection results. During inspection determine the following:

(1) The pressure limiting and regulating station is of adequate capacity and reliability of operation for the service in which it is employed.

(2) Set to function at the correct pressure.

(3) Properly installed and protected from dirt, liquids, and other conditions that might prevent proper operation."

There are no further instructions in this O&M. The Company basically copied the code.

The Company's O&M states:

1. "The Company shall **periodically** review the work performed by employees and Company representatives and modify the procedures when deficiencies are found."

Periodically should be defined. This is a quote from the Code. A more specific time frame needs to be implemented.

The Company O&M states:

1. "If a regulator will not achieve acceptable shut-off, repair and replace worn and defective parts, and re-test.
2. Each regulator will be checked for total lock-off unless prevented by station design limitations (i.e. lack of bypass or suitable valves)."

The manufacturer's manual reads:

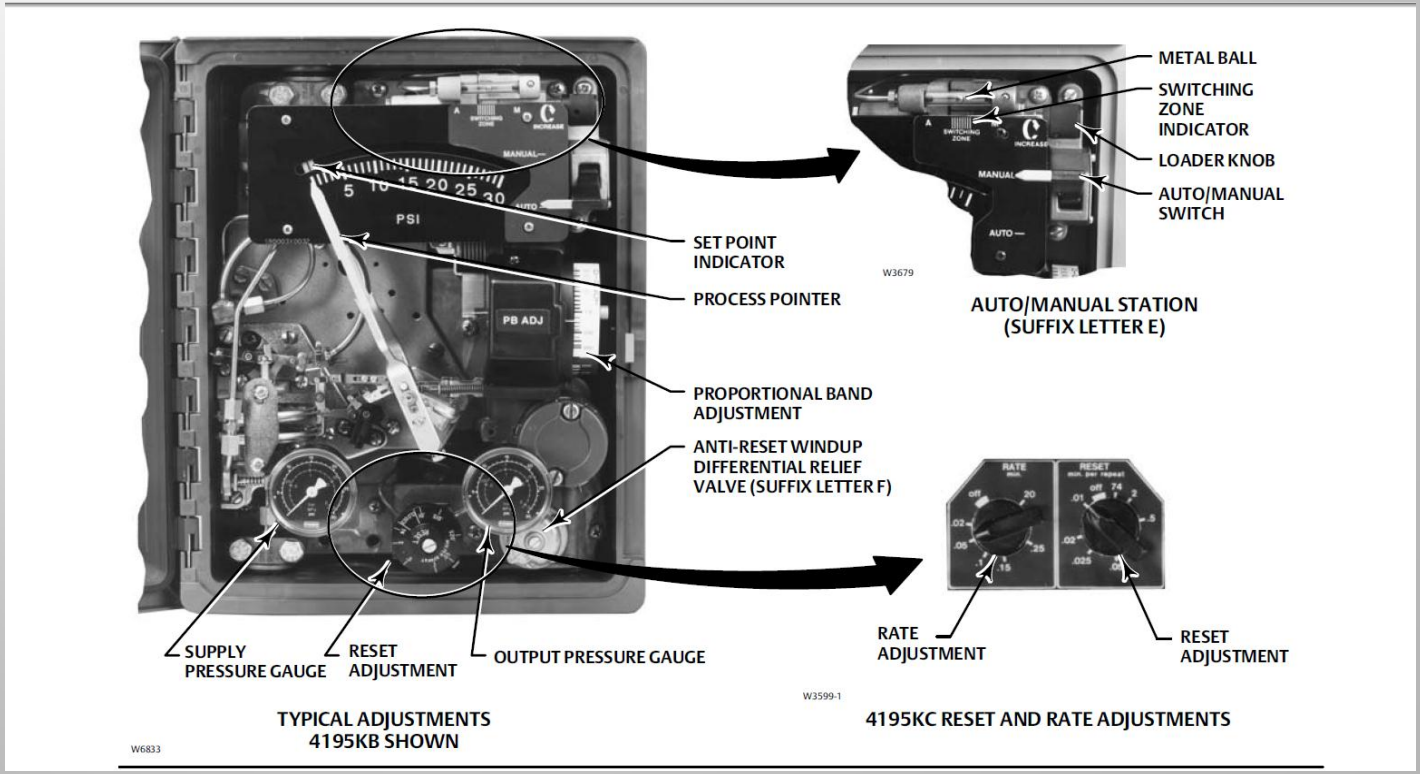
"The Flowgrid regulator should lock up (shut off) with zero pressure downstream."

There needs to be a definition of what is acceptable or reference to the manufacturer's instruction manual.

The Company's O&M states:

"Pressure controllers shall be inspected with the associated regulator(s) for response and defects."

The manufacturer's manual consist of 59 pages in the inspection and maintenance section and over 100 parts. There needs to be a definition of what an inspection consist of and what is proper "response and defects".



Contents (continued)

The Company's O&M states:

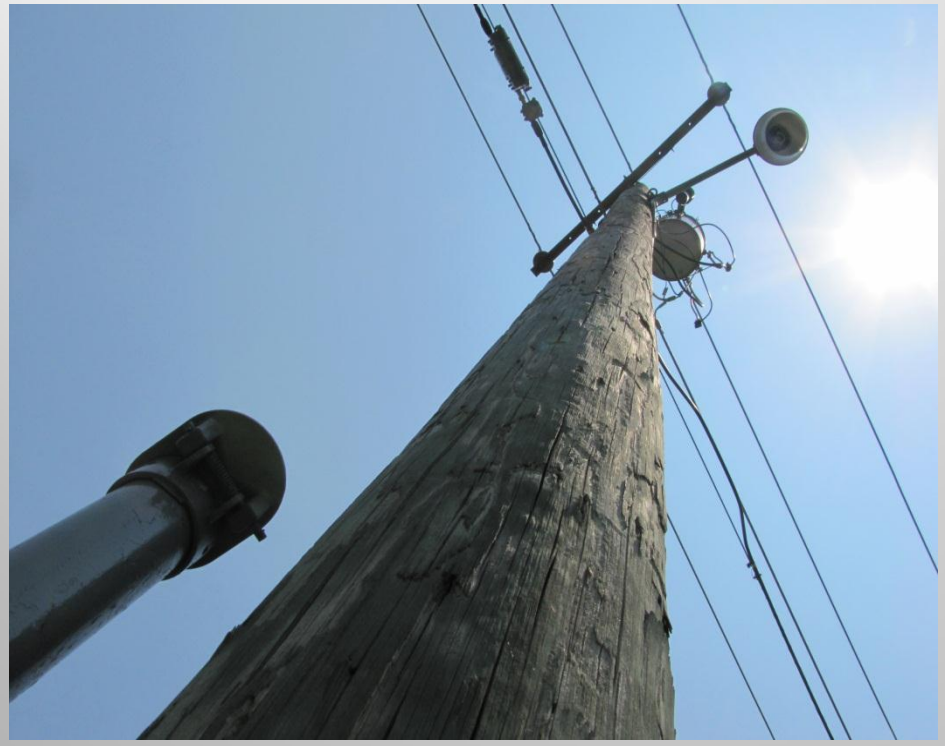
"Inspect any associated fences, buildings, vaults, pits, facility identification signs, warning signs, etc."

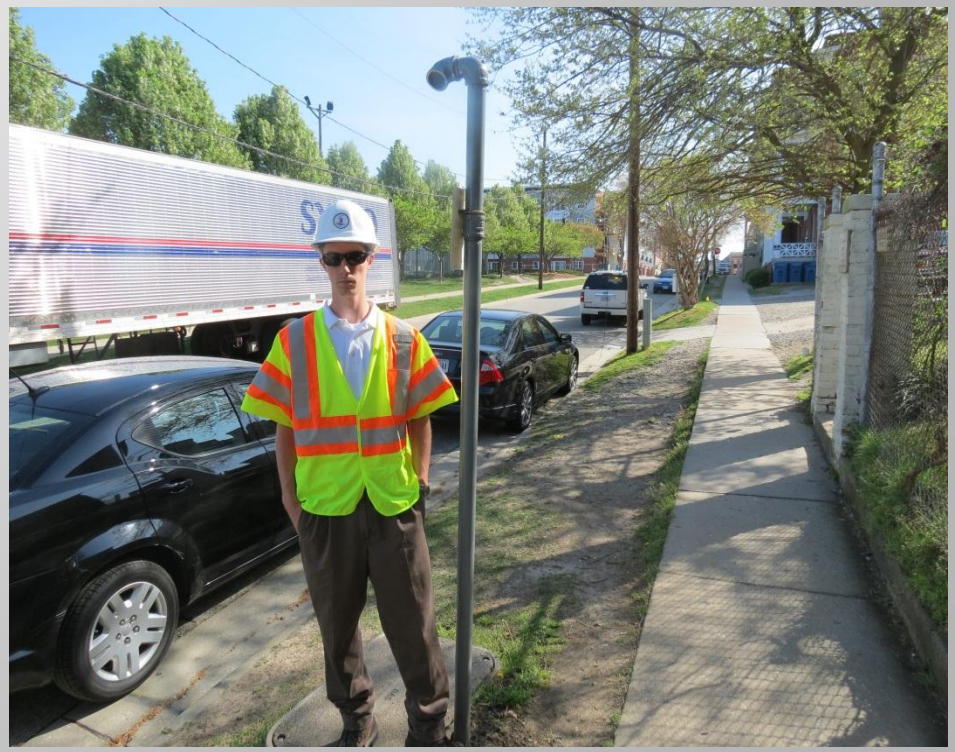
"etc" is be very broad. There is no mention of charts, telemetry, vent stacks, valve locks, fencing, heaters to include glycol levels, odorizers, grounds maintenance, vehicular protection or corrosion

The Company's O&M states:

"Vents and vent lines are to be inspected to see that they are secure, clear, have proper vent caps, and that no leaks are present."

No mention of venting to the atmosphere in a safe





The Company's O&M states:

"The following steps should be followed when performing an internal inspection. The steps taken will vary based on the regulator type.

•Inspect the seat and orifice for nicks, cuts, gouges, or debris. Clean or replace as needed.

•Inspect the boot for nicks, cuts, wear, or debris. Clean or replace as needed.

•Inspect gaskets, O-rings, seals, diaphragms when regulator operation or operating experience makes it advisable; and clean or replace parts as needed."

There is no mention of proper spring ranges or condition of the spring.

The Company's O&M states:

"Lubricate parts following manufacturer's recommendations. This varies greatly for various regulator types."

Where possible use and reference the manufacturer's instruction and maintenance material as a part of your procedure. This eliminates the need of having a Company generated procedure for each type of different equipment. For example, Mooney states not to lubricate O-rings and most rubber goods where Fisher states to lubricate their O-rings.

The Company's O&M states:

"Tear down inspections are to be done on an as needed basis either as a result of findings during the annual inspection or predetermined based on special circumstances i.e. dirty gas. All functions outlined below shall be performed during the tear down inspection.

a. Complete all steps required for an annual regulator station inspection.

b. Regulator valve assemblies, molded seats, diaphragms, and orifices shall be visually inspected for good mechanical conditions. Repair or replace all worn and defective parts."

There are no detailed directions on how to visually inspect the parts listed in the procedure.

Compare this to the manufacturer's instruction literature on the next 3 slides.

Fisher EZR

“Assembly

1. Install the inlet strainer or shim (key 23) into the body (key 1).
2. **Lightly lubricate and install the cage O-ring** (key 8).
3. **Apply lubricant lightly to all O-rings** or the mating part before installing them.
4. **Install the cage (key 7) and lightly lubricate** and install the bonnet O-ring (key 28).

To assemble a 6-inch / 152 mm cage with attached restrictor plate (key 71), **lightly lubricate the O-ring** (key 121) and place it on the restrictor plate. Secure the cage to the restrictor plate with the cap screws (key 126), using a torque of 10 to 12 foot-pounds / 14 to 16 N•m.

For NPS 2 x 1 / DN 50 x 25 sizes, the lower adaptor (key 132) must be assembled on the cage before placing in the body. Lightly lubricate the lower adaptor O-rings (keys 121 and 67) and place the lower adaptor on a flat surface. Then press the cage down into the lower adaptor.

5. **Lubricate the top and bottom of the outer edge (bead area) of the diaphragm** and place diaphragm and plug assembly (key 9) on the cage (key 7). For NPS 2 x 1 / DN 50 x 25 sizes, the upper adaptor (key 131) must be placed on the cage before the bonnet (key 2). Lightly lubricate the upper adaptor O-ring (key 133) and then press the upper adaptor onto the cage.
6. If travel indicator was removed, **lightly lubricate the travel indicator** assembly threads and screw it into the bonnet (key 2). See Travel Indicator Assembly Maintenance for maintenance.
7. Install the bonnet (key 2) in proper orientation.”

Note the requirement for lubrication.

Mooney Flow Grid

Assembly

NOTE: Do not lubricate diaphragm sealing surface.

1. Reassemble parts on the body per the assembly drawing in the parts supplement for the particular regulator size.

NOTE: Both the throttle plate and the diaphragm can be rotated 180 degrees (not turned upside down) to renew the shutoff capability if the inlet side is in better condition than the outlet.

2. Tighten main bolts in increments using a crisscross pattern. Torque bolting as indicated on regulator nameplate (or refer to Table 6).

Reassemble parts on the body per the assembly drawing in the parts supplement for the particular regulator size.

Bolting Torque Values

Clean Dry Bolts- Non-Lubricated

	Ft/ (n-m)
Flowgrid	250 20 (27.09)
1”	(ALL)[1] 25 (33.86)
2’ x 1”	(ALL)[1] 25 (33.86)
2”	(ALL)[1] 60 (81.26)
3”	(ALL)[1] 125 (169.28)
4” x 3”	(ALL)[1] 125 (169.28)
4”	ALL) [1] 125 (169.28)
6”	CL 150 & CL 300 Flanged 125 (169.28)
6”	CL 600 Flanged 200 (270.86)
10”	CL 150 & CL 300 Flanged 125 (169.28)
10”	CL 600 Flanged 200 (270.86)
12”	CL 150 & CL 300 Flanged 125 (169.28)
12”	CL 600 Flanged 200 (270.86)
All Flowgrid Pilots	10 (13.54)

[1] Refer to WARNING below.

Table 6

WARNING

Lubricating and/or overtightening the bolting can damage the Diaphragm in the 1” and 2” sizes of the Flowgrid regulator.

WARNING

DO NOT replace the studs or nuts with any bolt or stud and nut combination that does NOT have an SAE Grade 7 or ASTM Grade B7 rating.

3. Reconnect the pilot system. Follow Start up

Start up and Operation

The following procedures are suggested for start up of the Flowgrid regulator Start up of the Flowgrid regulator should be made by qualified personnel familiar with high pressure systems and pilot operated regulators.

WARNING

The instruction manual for the PILOT(S) being used should be consulted to ensure that the installation and start up instructions for the pilot are followed. Some pilots can be damaged if not installed and put into operation correctly.

Pressure Reducing Regulator

1. Adjust the pilot restrictor to an intermediate opening (a "4" setting on the Mooney Type 24 Restrictor).
2. Back off on the pilot adjusting screw to fully relieve all the spring compression.
3. If installed, open hand regulator(s) in the control line(s), and the pilot supply line.
4. Slightly open downstream block regulator or open vent in piping downstream of the Flowgrid regulator.
5. Slowly open the upstream block regulator to pressurize the Flowgrid regulator and pilot system. The Flowgrid regulator should lock up (shut off) with zero pressure downstream.
6. Use vent in the downstream piping or slowly open the outlet block regulators.
7. Slowly increase the pilot spring setting until some flow is achieved through vent or into downstream system. Adjust the pilot restrictor for stability and performance as follows:
   a. If the system is stable, adjust the pilot restrictor to a more closed position (towards MIN setting). Change the flow rate or increase the pilot setting to check the operation of the system during an upset.
   b. If the system is stable, repeat step (a) until the system is unstable (oscillating).
   c. Now readjust the restriction to a more open position (towards MAX setting) where the system is stable.
   d. Vary the flow rate over as wide a range as possible to make sure the system will be stable under all flow conditions.

NOTE: Adjustment of the restrictor affects the response rate, stability, and sensitivity of the regulator. CLOSING the pilot restrictor (moving adjustment towards MIN setting) will result in higher gain (narrow the proportional band), more sensitivity, and slower closing speeds. OPENING the pilot restrictor (moving the adjustment towards MAX setting) will result in less gain (widen the proportional band), less sensitivity, and faster closing speeds.

8. Slowly increase the pilot spring setting until the desired downstream pressure is achieved.
9. Slowly close the downstream block regulator or vent to check the Flowgrid regulator for lockup (shut off).
10. Slowly open the downstream block regulator. to begin normal operation

Back Pressure Regulator or Relief Regulator

1. Adjust the pilot restrictor to an intermediate opening (a "4" setting on the Mooney Type 24 Restrictor).
2. Increase pilot spring compression to maximum or some margin above desired setting.
3. If installed, open hand regulators(s) in the control line(s), and the pilot supply line.
4. Check that the Flowgrid regulator is vented to atmosphere or the downstream system is ready to accept flow.
5. Open the downstream block regulator or open vent in piping downstream of the Flowgrid regulator.
6. Slowly open the upstream block regulator to pressurize the Flowgrid regulator and pilot system.
   The Flowgrid regulator should lock up (shut off) with zero pressure downstream.
7. Slowly decrease the pilot spring setting until some flow is achieved. The flow may only be through the pilot system.
8. Adjust the pilot restrictor for stability and performance as follows:
   a. If the system is stable, adjust the pilot restrictor to a more closed position (towards MIN setting). Change the flow rate or increase the pilot setting to check the operation of the system during an upset.
   b. If the system is stable, repeat step (a) until the system is unstable (oscillating).
   c. Now readjust the restriction to a more open position (towards MAX setting) where the system is stable.
   d. Vary the flow rate over as wide a range as possible to make sure the system will be stable under all flow conditions.

NOTE: Adjustment of the restrictor affects the response rate, stability, and sensitivity of the regulator.

CLOSING the pilot restrictor (moving adjustment towards MIN setting) will result in higher gain (narrow the proportional band), more sensitivity, and slower closing speeds. OPENING the pilot restrictor (moving the adjustment towards MAX setting) will result in less gain (widen the proportional band), less sensitivity, and faster closing speeds.

9. Slowly adjust the pilot spring setting until the desired upstream pressure (relief setting) is achieved.

The Company's O&M states:

"Inspect the coating with a holiday detector just prior to the lowering-in process."

There is no mention of:

1. **What settings to use on the holiday detector;**
2. **How to check the calibration on the holiday detector;**
3. **Proper operation of the holiday detector;**
4. **Specifics of proper installation of the coating.**

The Company's O&M states:

"Choose relatively rock-free soil to backfill under and around the pipe. Do not tamp directly over the pipe until at least twelve (12) inches of relatively rock-free soil has been placed over the pipe. See Section XIII.A.4."

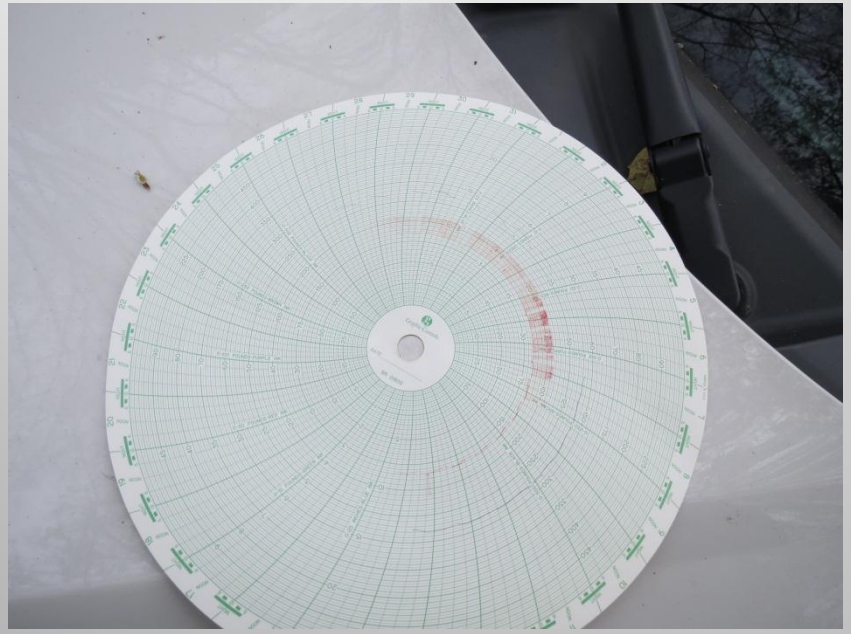
What does relatively rock free soil consist of? There needs to be specifications for rock free soil.

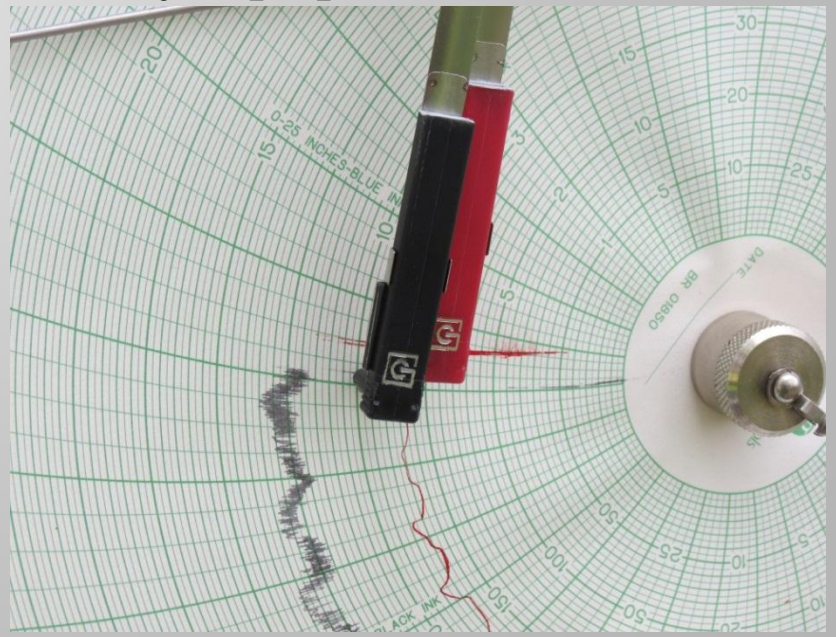
The Company's O&M states:

Calibration of Gauges

"Pressure gauges should be handled carefully and periodically checked for accuracy."

Calibration gauges are used for the calibration of telemetry and charts that are used to determine if a pipeline may have been over pressured. Periodically needs to be better defined. There needs to be guidance relative to the changing of charts. In some cases a chart that is not accurate or not legible is a violation. The same is true for telemetry equipment.





The Company's O&M states:

"Any joints made by joining of materials other than by welding must conform to 49 CFR 192 Subpart F".

The Manufacturer's instruction manual reads as below.

4.) Identify the location of the fitting to be installed on the pipe and mark the area with a non-greasy marker. (See "Markers" page 4)

If installing a coupler, measure the total length of the coupler to be installed. Make a mark (with a non-grease marker) from the pipe end that is 1/2 the total length of the coupler. This mark is for stab depth purposes and will ensure that the pipe end is inserted to the center of the coupler.

Page 12

An example of improper cut or facing

An example of improper stab markings

The Company O&M states:

- "When selecting a meter location, consideration should be given to the potential damage by outside forces (such as vehicles, construction equipment, tools or materials, which could be placed on the meter, and falling objects). When such potential is evident, the meter should be protected or an alternate location selected."

When is meter protection needed?

How should you protect a meter?

More Direction Needed

- Providing clarity helps ensure a consistent standard result is attained.
  - Consider questions that may be asked by a new employee for the determination of adequate protection from vehicular damage.
  - How is adequate protection determined?
  - Do you account for the size, location, pressure and type of facility?
  - What is the Company Standard?
  - If all that was provided to the employee was the procedure, would they do it right?

How would you protect this meter?

Are there clear directions provided to protect this meter?

The Company O&M states:

- "Exposed mains and mains attached to bridges need to be patrolled to observe factors affecting safe operation and to enable correction of potentially hazardous conditions. In addition to visual evidence of leakage, patrol considerations should include observation and reporting of hazards such as the following.
- a.) Excavation, grading, demolition or other construction activity which could result in:
  - 1) Damage to the pipe.
  - 2) Loss of support due to settlement or shifting of soil around the pipe.
  - 3) Undermining or damage to pipe supports.
  - 4) Loss of cover.
  - 5) Excessive fill.
- b.) Physical deterioration of exposed piping, pipeline spans and structural supports (such as bridges, piling, headwalls, casings and foundations)
- c.) Land subsidence, earth slippage, soil erosion, flooding, climatic conditions and other natural causes that can result in impressed secondary loads.
- d.) Need for additional distribution pipeline identification and marking in private right-of-way and in rural areas. Use line markers on all above ground piping. "

What are potentially hazardous conditions?

There is no mention of monitoring atmospheric corrosion.

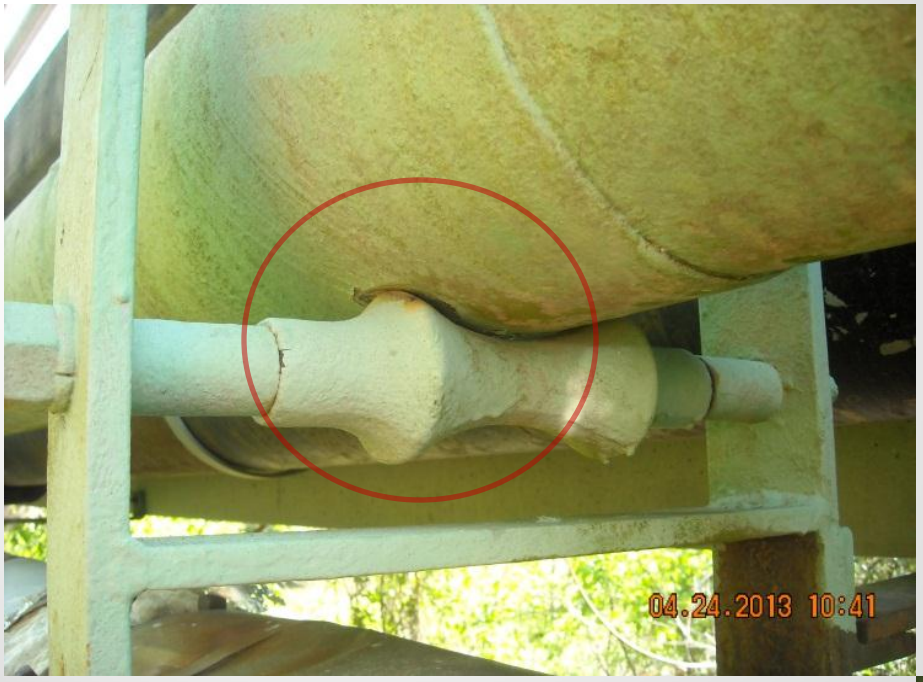
Does the procedure tell the person inspecting what to look for?

Is the procedure clear about what actions to take?

The Company O&M states:

- *"Superintendents* and *Supervisors* of each of the *Division Sections* are responsible for providing instructions to their personnel concerning recognition and response to unsafe or unsatisfactory conditions recognized during their daily activities. The focus of instruction shall be on:
- (1) The effect of exposure or movement on pipeline facilities
- (2) Failures resulting in leaks
- (3) Corrosion
- (4) Evidence and effects of grading, excavation and other construction activities
- (5) Effects of encroachments on pipeline facilities
- (6) Potential for gas migration through air intakes into buildings
- (7) Evidence of tampering, vandalism or other damage
- Any unsafe or unsatisfactory condition which requires immediate attention shall be reported to the *Gas Dispatcher* for response actions."

What are the instructions on recognition and response from the Superintendents and Supervisors?



Dent found on Pipe indicating pipe alignment has changed (Left).

Second Roller found not in contact (Below).

Is this a pipe support problem or are there other issues contributing to this?

Pipe found encroached upon by another facility.
(4 total contact points).

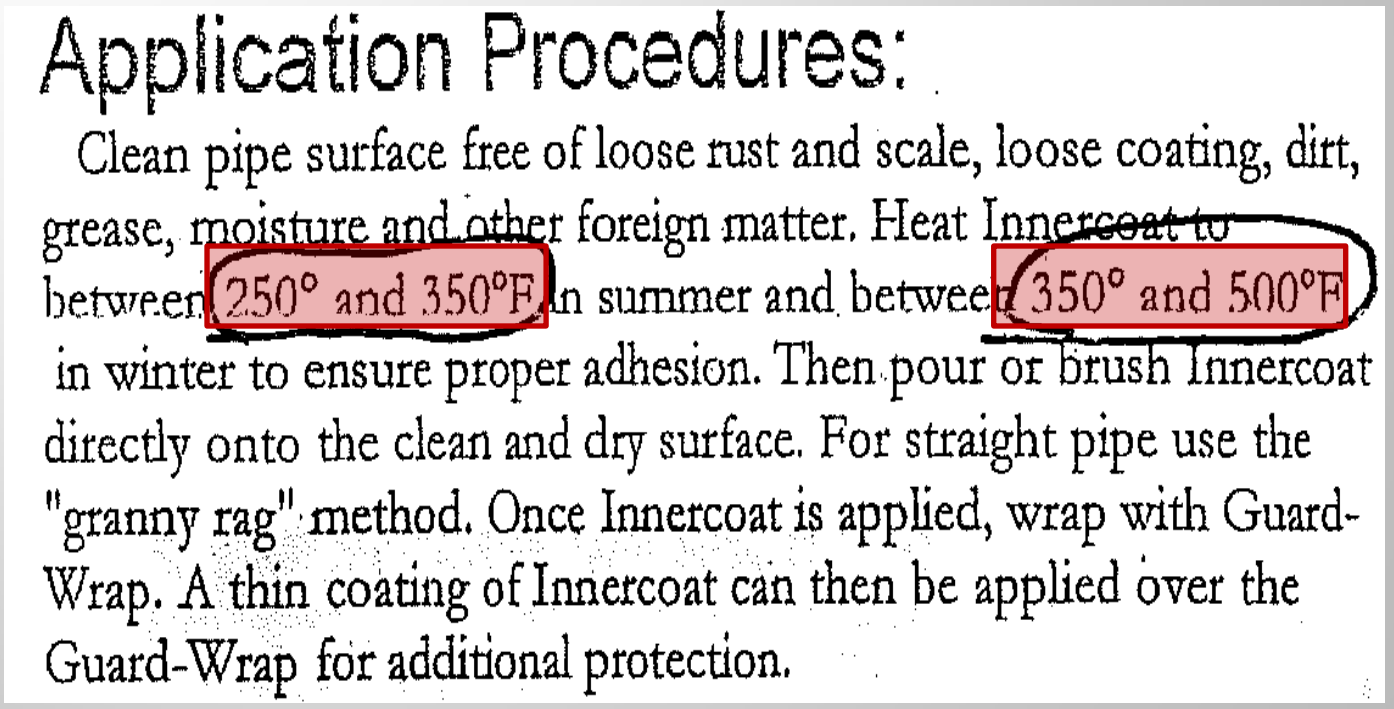
The Company O&M states:

- "Install mechanical coupling transition fittings in accordance with manufacturer's instructions that are shipped with each coupling or are printed on the coupling bag.
  - Multiple bolted compression couplings are installed using a torque wrench or torque measuring device to torque the bolts to the manufacturer's recommended torque in the proper order as is described in Section 5274, Flange Connections.
  - Screw on compression end couplings are torqued using a torque wrench or torque-measuring device fitted with a pipe wrench adapter to the manufacturer's recommended torque."

There is no mention or reference to proper corrosion prevention actions to be taken.

The Company O&M states:

- "Coat all exposed steel surfaces with a coating designed to protect the external surfaces of the pipe from corrosion. Follow the manufacturer's instructions for applying the coating."



Application Procedures:

Clean pipe surface free of loose rust and scale, loose coating, dirt, grease, moisture and other foreign matter. Heat Innercoat to between 250° and 350°F in summer and between 350° and 500°F in winter to ensure proper adhesion. Then pour or brush Innercoat directly onto the clean and dry surface. For straight pipe use the "granny rag" method. Once Innercoat is applied, wrap with Guard-Wrap. A thin coating of Innercoat can then be applied over the Guard-Wrap for additional protection.

Manufacturer's procedures do not mention use with metal to plastic transition fittings.

Pipe Manufacturer's Material Specifications

DriscoPlex® 6500 Pipe and Fittings meet or exceed:

ASTM D2513, D2683, D3261
CAN/CSA-B137.4
UPC
ASTM D3350, cell classification PE234373E and PE234375E
PPI TR-4 designations PE2708 (PE2406) and PE80
PPI TN-30

DriscoPlex® 6500 Yellow MDPE Pipe and Fittings for

Natural Gas Distribution, LPG and
Propane Gas Distribution, Yard Gas
Iron Pipe Size OD (IPS) ½" to 24",
Copper Tube Size OD (CTS) ½" to 1 ¼"
Coils available up through 6"

Outdoor Storage up to Three (3) Years per ASTM D2513

NOMINAL PIPE PROPERTIES [1]	UNIT	TEST METHOD	VALUE
Density	gms / cm^3	ASTM D1505	0.939 (yellow)
Melt Index (MI) Condition 190°C / 2.16kg	gms / 10 min	ASTM D1238	0.18
Hydrostatic Design Basis 73°F (23°C)	psi	ASTM D2837	1250
Hydrostatic Design Basis 140°F (60°C)	psi	ASTM D2837	1000
Minimum Required Strength	MPa (psi)	ISO 9080	8.0 (116)
Rapid Crack Propagation (Pc) 0°C (32°F) [3]	Bar (psi)	ISO 13478	8.5 (123)
Color; UV Stabilizer [E]	--	ASTM D3350	Yellow; UV stabilized
Pipe Test Category	--	ASTM D2513	CEE
NOMINAL MATERIAL PROPERTIES [1] [2]	**UNIT**	**TEST METHOD**	**VALUE**
Flexural Modulus at 2% secant	psi	ASTM D790	>90,000
Tensile Strength at Yield	psi	ASTM D638 Type IV	2,800
Elongation at Break 2 in / min., Type IV bar	%	ASTM D638	>800
Hardness	Shore D	ASTM D2240	63
PENT	hrs	ASTM F1473	>2,000
Vicat Softening Temperature	°F	ASTM D1525	227
Brittleness Temperature	°F	ASTM D746	< -103

Hot wax applied to mechanical coupling connecting plastic to steel piping.

Considerations for Manufacturer's Procedures

- Do the procedures apply?
- If only part of the procedures apply then prior to use:
  - Testing must occur prior to use
  - Specific instructions must be developed and tested for any variances to procedures
  - Updated training must be completed

Conclusion and Summary

- Procedures must
  - Be Clear, Instructive, Detailed, Available
  - Meet the requirements of all applicable parts of 192
  - Reference Manufacturer's literature and instructions as often as possible.
  - Be a reflection of a good Safety Culture

Questions?